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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/759,212	01/11/2001	Rong-Chang Liang	26822-003US	1814

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EXAMINER
PARKER, KENNETH

ART UNIT	PAPER NUMBER
2871	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/759,212	LIANG ET AL.	
	Examiner	Art Unit	
	Kenneth A Parker	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 4/27/03

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 47-88 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 74-88 is/are allowed.

6)☒ Claim(s) 47-62 is/are rejected.

7)☐ Claim(s) 63-73 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,3 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

Claims 63-73 are objected to because of the following informalities:

The cups lack antecedent basis. It is presumed that there is a step of making the microcups, and examined according to that assumption.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obvious to one of ordinary skill at the time the invention was madeness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to one of ordinary skill at the time the invention was made at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 47, 51-53, 56-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagae et al 5995190.

Nagae discloses a method with

a) coating a thermoset precursor on a conductor

b) embossing with the layer with a prepatterned male mold

The claims are written to "a process for the preparation of well-defined cells to be used in a liquid crystal display, which process comprises the steps of":

a) coating a layer of thermoplastic or thermoset precursor on a conductor film;

- see sequence between paragraph 49 and 50 below
b) embossing the thermoplastic or thermoset precursor layer with a prepatterned male mold;
-paragraph 50 (the mold had to be prepatterned or in would not have been a mold)

c) releasing the mold from the thermoplastic or thermoset precursor layer;
d) hardening the thermoplastic or thermoset precursor layer; and
e) filling the thus formed array of microcups with a liquid crystal composition.
-see paragraph 53 below)

Lakcing is the releasing and hardening. As molding without releasing the mold and hardening not have created the pattern as shown in the associated figures, and was the necessary for the completion of any molding process, it would have been obvious to one of ordinary skill at the time the invention was made in order that the process be completed.

Also claimed are:
56. The process of Claim 47 wherein the pre-patterned male mold is released before, during or after the thermoplastic or thermoset precursor layer is hardened.
51. The process of Claim 47 wherein the thermoplastic or thermoset precursor layer is embossed at a temperature near or above its glass transition temperature.
52. The process of Claim 51 wherein the glass transition temperature ranges from about -70°C to about 150°C.
53. The process of Claim 51 wherein the glass transition temperature ranges from about -20°C to about 100°C.

Note also that the term "cup" assumes any indentation or structure that could hold a liquid- so the cells have to have such a structure, but don't have to only have such a structure (in Nagae the cup is the lower part of the cell).

Since the molding is done above the softening temperature (below), it is above the glass transition temperature (it must be). Lacking is that the glass transistion temperature is above room temperature. It was notoriously well known that the glass transistion temperature should be above the use temperature so that the polymer does not adversely effect the liquid crystal. Therefore it would have been obvious to one of ordinary skill at the time the invention was made, in the device of Nagae, to have the material have a glass transition temperature above room temparture for the benefit of not adversely effecting the liquid crystal. To have it limited to below 100 degrees would have been obvious to one of ordinary skill at the time the invention was made so as to limit the required heating. Therefore it would have been obvious to one of ordinary skill at the time the invention was made, in the device of Nagae, to limit the glass transistion temperature to limit the required heating.

50) Transparent electrodes of ITO (a mixture of indium oxide and tin oxide) having a thickness of 500 .ANG. are formed on a glass substrate 1.1 mm thick. Such substrates are used for a pair of substrates.
51) A photoresist (V-259PA manufactured by Nippon Steel Chemical Co., Ltd.) containing 0.5% by weight of spacer (having a diameter of 4.5 .mu.m) for retaining a cell gap was applied onto one of the pair of substrates, and the substrate was subjected to patterning using a photomask, as shown in FIGS. 2A and 2B. Next, a photoresist (OMR83 manufactured by Tokyo Ohka Kogyo Co., Ltd.) was formed into a film having a thickness of about 2.0 .mu.m on the substrate which had been subjected to the patterning, and then the substrate was placed in an oven at 200.degree. C. to soften the film. Next, a mold shown in FIGS. 3A and 3B was pressed onto the softened film so as to form an inverted conical shaped concave portion for every pixel as shown in FIGS. 4A and 4B. Then, an ITO film was formed by sputtering to obtain a targeted substrate.

(52) A sealing agent (Struct-bond XN-21S) containing glass fibers (having a diameter of 4.5 .mu.m) was printed on the other substrate including ITO as transparent electrodes. This step may be performed prior to the above-mentioned concave portion formation step.

(53) Next, the thus produced two substrates were attached to each other. Next, a uniform mixture of the following substances was injected between the attached substrates to produce a liquid crystal cell: 0.1 g of R-684 (manufactured by Nippon Kayaku Co., Ltd.); 0.1 g of p-phenylstyrene; 10.06 g of a compound represented by Formula (I); 3.74 g of a liquid crystal material ZLI-4792 (manufactured by Merck & Co., Inc.; containing 0.4% by weight of S-811); and 0.02 g of a photopolymerization initiator (Irgacure 651 manufactured by Chiba-Geigy Corporation). ##STR1##

Also

(18) A first method includes the steps of forming a film for forming a concave portion on a substrate end pressing the film with a mold having a predetermined concave or convex surface (e.g., a mold having a convex portion of a conical shape or elliptical conical shape) so as to form a predetermined concave portion in a predetrmined position in the film. The film for forming a concave portion may be formed from a thermosetting insulating material, a thermoplastic insulating material or photosensitive insulating material. The film for forming a concave portion is formed by any known methods. The thickness of the film is preferably about 1 to about 3 .mu.m, and more preferably about 2 .mu.m.
(19) Preferably, the pressing is performed while heating. The heating temperature can vary depending on the material for the film on 1hich the concave portion is to be formed, but preferably about

180.degree. C. to 220.degree. C., and more preferably about 200.degree. C.

(20) A second method includes the steps of stacking a plurality of films having a circular or elliptical shape when viewed from the normal direction of the substrate on the substrate in such a manner that a film closer to the substrate has a larger area, so as to form a convex portion having steps in its circumference, and forming a film covering the convex portion so as to form a concave portion (e. g., an inverted conical shape or inverted elliptic conical shape) having a smooth surface and having the bottom portion between the adjacent convex portions.

Regarding claim 57- claim 57 is written to a process for the preparation of well-defined cells to be used in a liquid crystal display, which process comprises the steps of:
a) coating a layer of radiation curable composition on a conductor film;
b) imagewise exposing the radiation curable layer;
c) removing the unexposed areas by a developer or solvent to reveal an array of microcups; and
d) filling the microcups with a liquid crystal composition.

Above in paragraph 51, the coating and exposing are disclosed, however the removing was not explicitly discloses. As developing with out removing would not have created the pattern as shown in figure 2, and was the necessary completion of any photopatterning process, it would have been obvious to one of ordinary skill at the time the invention was made in order that the process be completed.

Regarding claim 58- claim 58 is written the process of Claim 57 wherein said microcups are filled with the liquid crystal composition and guest dye(s). Dyes were well known for absorbing light and enabling polarizer free displays, therefore having high brightness. Therefore, it would have been obvious to one of ordinary skill at the time the invention was made, in the device of Nagae et al, to employ a dichroic dye (guest dye) for the benefit of enabling polarizer free and high brightness display.

Claims 48,50, 54-55, 59, 61-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagae et al 5995190 in view of Aida et al 6191250.

Regarding claims 48, 50, 54-55,59, 61-62, they are as follows:

48. The process of Claim 47 wherein said thermoplastic of thermoset precursor is selected from a group consisting of polyvalent acrylate or methacrylate, polyvalent vinyl, polyvalent epoxide, polyvalent allyl, and oligomers or polymers derived therefrom. Methacrylate

50. The process of Claim 48 wherein said oligomers or polymers are derived from those containing crosslinkable functional groups.

54. The process of Claim 47 wherein the hardening of the thermoplastic or thermoset precursor layer is accomplished by cross-linking by radiation, heat, moisture, cooling or evaporation of a solvent or plasticizer.

This is in the primary reference as discussed above

55. The process of Claim 47 wherein the hardening of the thermoplastic or thermoset precursor layer is accomplished by UV, visible light, near IR, or electron beam radiation.

This is in the primary reference as discussed above

59. The process of Claim 57 wherein said radiation curable composition comprises a material selected from the group consisting of polyvalent acrylate or methacrylate, polyvalent vinyl, polyvalent epoxide, polyvalent allyl, oligomers or polymers derived therefrom.

61. The process of Claim 59 wherein said oligomers or polymers are derived from those containing crosslinkable functional groups.

62. The process of Claim 57 wherein the imagewise exposure is accomplished by UV, visible light, near IR, or electron beam radiation.

This shown as discussed above.

Nagae et al discloses as follows:

The overcoat layer in which the concave portion is to be formed is formed using a photocurable resin (e.g., (meth)acrylic acid or (meth)acrylate substituted with alkyl group having three or more carbon atoms or phenyl group (e.g., isobutyl acylate, n-butyl methacrylate), a thermosetting resin (e.g., epoxy acrylate), or a thermoplastic resin (e.g., polyimide, polyphenylene oxide). Polyimide, epoxy acrylate or the like, which have excellent heat resistance, can be preferably used. This is because, in the present invention, the overcoat layer exists in the liquid crystal cell until the liquid crystal display device is completed, and transparent electrodes are further formed on the overcoat layer.

Lacking from the disclosure of Nagae et al is the material being crosslinked or polyvalent. Aida et al teaches that the material having the property of being polyvalent and crosslinked offers the benefits of excellent properties such as rigidity, ductibility, weatherability, scratch resistance, low-temperature resistance and film-forming ability.

172) 1+L ' when preparing a crosslinked and cured film from the above-mentioned radical copolymers and polyvalent isocyanates, since the reactivity of the hydroxyl groups in the termini of the molecule is the same, the crosslinking density is high, the synthesised film has a uniform by crosslinked structure; the film itself has excellent

properties such as rigidity, ductibility, weatherability, scratch resistance, low-temperature resistance and film-forming ability.

Therefore it would have been obvious to one of ordinary skill at the time the invention was made, even to one of ordinary skill, to employ the acrylic as one having polyvalent and crosslinked properties, as it offers the benefits of excellent properties such as rigidity, ductibility, weatherability, scratch resistance, low-temperature resistance and film-forming ability.

Claims 49, 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagae et al 5995190 in view of in view of Aida et al 6191250 as applied above, and further in view of Hakemi et al 5843333.

Regarding claims 49 and 60, they are as follows:
49. The process of Claim 48 wherein said polyvalent vinyl is vinyl benzene, vinylsilane or vinyl ether.
60. The process of Claim 59 wherein said polyvalent vinyl is vinyl benzene, vinylsilane or vinyl ether.

Lacking is vinyl ether or any other material from the list. The secondary reference teaches that vinyl ether is a functionally equivelant alternative to the acrylics, and suitable for an encapsulating medium for liquid crystal (see below). Therefore it would have been obvious to one of ordinary skill at the time the invention was made, in the device of Nagae et al as modified above, to employ the vinyl ether as an equivelent alternative because it was suitable for the intended purpose.

n another embodiment hereof, a material capable of forming liquid crystals is incorporated in a polymeric binder by dissolving or dispersing the former material in a polymer solution or molten polymer, then fabricating the polymer by a suitable technique (solution casting, molding, extrusion, etc.). Following solvent evaporation and/or cooling of molten polymer, the polymer will act as a binder and protective matrix for the liquid crystals. Composites of the invention are obtainable from the use of thermoplastics, in which the organometallic liquid crystal composition, alone or in combination with non-metallic liquid crystals, are dissolved in a melt of the polymer or a solvent solution of the polymer. Suitable thermoplastic materials for use as this polymeric matrix would include the following: polyethylene; polypropylene; poly(1-butene); poly(4-methyl-1-pentene); polyisobutylene; polystyrene; polybutadiene; polychloroprene; poly(methyl methacrylate); poly(ethyl methacrylate);

poly(n-butyl methacrylate); poly(vinyl acetate); poly(vinyl alcohol); poly(vinyl chloride); poly(vinylidene chloride); poly(vinyl fluoride); poly(vinylidene fluoride); poly(caprolactam); poly(hexamethyleneadipamide); poly(ethylene terephthalate); polyoxymethylene; poly(ethylene oxide); poly(propylene oxide); poly(phenylene oxide); Bisphenol A polycarbonate; dimethyl polysiloxane; poly(N-vinylpyrrolidinone); poly(ethyleneimine); ethyl cellulose; methyl cellulose; hydroxyethyl cellulose; hydroxypropyl cellulose; sodium carboxymethyl cellulose; cellulose nitrate; cellulose acetate; poly(acrylic acid) and its salts; poly(methacrylic acid) and its salts; polyacrylamide; polyacrylonitrile; poly(methacrylonitrile); poly(caprolactone); phenoxy resins; 2-hydroxyethyl methacrylate polymers; 2-hydroxypropyl methacrylate polymers; acrylonitrile 2-hydroxyethylacrylate copolymers; acrylonitrile 2-hydroxypropylmethacrylate copolymers; ethylene-ethyl acrylate copolymers; ethylenepropylene copolymers; ethylene-vinyl acetate copolymers; vinyl chloride-vinyl acetate copolymers; styrene-butadiene copolymers; styrene-isoprene copolymers; styrene-acrylonitrile copolymers; styrene-methyl methacrylate copolymers; polyvinyl format; polyvinyl butyral; poly(methyl acrylate); poly(ethyl acrylate); poly(-vinyl propionate); ethylene-acrylic acid copolymers and their salts; cellulose acetate; cellulose propionate; cellulose acetate butyrate; poly(diallyl phthalate); poly(decamethylene adipamide) poly(11-aminoundecanoic acid); poly(12-aminododecanoic acid); poly(methyl vinyl ether); poly(isobutyl vinyl ether); and the like. Needless to say, the refractive indices of the liquid crystal components and the polymer has to essentially match to the extent taught in the art in order to obtain operative the electrooptical devices contemplated by the invention.

Allowable Subject Matter

Claims 74-88 are allowed. None of the prior art taught or suggested a liquid crystal formed as claimed where the cups are sealed and an electrode is then laminated.

Claims 63-73 would be allowable if amended to overcome the objection as suggested by the examiner. The reasons for the indication of allowable subject

matter associated with these claims it the sealing by phase separation of materials with the claimed specific gravity ratio.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth A Parker whose telephone number is 703-305-6202. The examiner can normally be reached on 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-0956.

Kenneth A Parker
Primary Examiner
Art Unit 2871

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May 18, 2003